

I claim:

1. A low-boron, high-barium concentration glass fiber composition comprising:

less than about 1 weight percent boron;

5 from about 5.5 to about 18 weight percent barium oxide; *metal*  
from about 10 to about 14.5 weight percent alkali oxide;  
from about 4 to about 8 weight percent alumina;  
from about 1 to about 9 weight percent alkaline earth oxide,  
excluding barium oxide;

10 from about 2 to about 6 weight percent zinc oxide;  
from about 0.1 to about 1.5 weight percent fluorine; and  
a balance of the glass fiber composition being silica.

2. The glass fiber composition of claim 1, wherein the boron is  
15 present as *B<sub>2</sub>O<sub>3</sub>*, alkali oxide is present as Na<sub>2</sub>O or K<sub>2</sub>O, and alkaline earth oxide  
is present as CaO or MgO.

3. The glass fiber composition of claim 1, wherein the alkali *metal*  
oxide is present as Na<sub>2</sub>O and K<sub>2</sub>O and alkaline earth oxide is present as CaO and  
20 MgO.

4. The glass fiber composition of claim 1, further comprising  
less than about 0.2 weight percent of one or more compounds selected from  
the group consisting of MnO, SrO, Li<sub>2</sub>O, TiO<sub>2</sub>, ZrO<sub>2</sub> and Fe<sub>2</sub>O<sub>3</sub>.

25 5. A low-boron, high-barium filter comprising:  
glass fibers comprising,  
about 0 to 1 weight percent boric oxide;  
from about 6 to about 16 weight percent barium oxide;  
30 from about 10 to about 14.5 percent R<sub>2</sub>O, wherein R<sub>2</sub>O is a  
mixture of sodium oxide and potassium oxide;  
from about 4 to 8 weight percent alumina;

from about 1 to about 9 weight percent calcium oxide and magnesium oxide; from about 2 to about 6 weight percent zinc oxide; from about 0.5 to about 1.5 weight percent fluorine; 5 a balance of the glass fibers being silica; and wherein the glass fibers have an average diameter of from about 0.1  $\mu\text{m}$  to about 8.15  $\mu\text{m}$ .

10 6. The filter of claim 5, wherein the average diameter of the glass fibers is from about 0.1  $\mu\text{m}$  to about 3.0  $\mu\text{m}$ .

7. Low-boron, high-barium fine-diameter glass fibers comprising:

15 less than about 1 weight percent of  $\text{B}_2\text{O}_3$ ; from about 5.5 to about 18 weight percent  $\text{BaO}$ ; from about 10 to about 14.5 weight percent of  $\text{Na}_2\text{O}$  and  $\text{K}_2\text{O}$ ; from about 4 to about 8 weight percent of  $\text{Al}_2\text{O}_3$ ; from about 1 to about 9 weight percent  $\text{CaO}$  and  $\text{MgO}$ ; from about 2 to about 6 weight percent  $\text{ZnO}$ ; 20 from about 0.1 to about 1.5 weight percent  $\text{F}_2$ ; less than about 0.2 weight percent of  $\text{MnO}$ ,  $\text{SrO}$ ,  $\text{Li}_2\text{O}$ ,  $\text{TiO}_2$ ,  $\text{ZrO}_2$  and  $\text{Fe}_2\text{O}_3$ ; and a balance of  $\text{SiO}_2$ .

25 8. The glass fibers of claim 7, wherein the glass fibers have an average diameter of from about 0.1  $\mu\text{m}$  to about 3.0  $\mu\text{m}$ .

9. A low-boron, high-barium glass fiber composition comprising: less than about 1 weight percent of boric oxide; 30 from about 6 to about 16 weight percent barium oxide; *and* from about 10 to about 12.5 weight percent of alkali oxide; from about 5 to about 6 weight percent of alumina oxide;



from about 1 to about 9 weight percent alkaline earth oxide; from about 2 to about 5 weight percent zinc oxide; from about 0.1 to about 1.0 weight percent fluorine; and a balance of the composition being silica.

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10. The glass fiber composition of claim 9, wherein the glass fiber composition forms glass fibers having an average diameter of from about 0.1  $\mu\text{m}$  to about 3.0  $\mu\text{m}$ .

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11. The glass fiber composition of claim 9, wherein boron is present as  $B_2O_3$ , alkali oxide is present as  $Na_2O$  and  $K_2O$ , and alkaline earth oxide is present as  $CaO$  and  $MgO$ .

12. The glass fiber composition of claim 9, further comprising  
15 less than about 0.2 weight percent of one or more compounds selected from  
the group consisting of MnO, SrO, Li<sub>2</sub>O, TiO<sub>2</sub>, ZrO<sub>2</sub>, and Fe<sub>2</sub>O<sub>3</sub>.

13. A low-boron, high-barium glass fiber composition comprising:  
less than about 1 weight percent of boron;  
from about 6 to about 16 weight percent barium oxide;  
from about 10 to about 12.5 weight percent of alkali oxide;  
from about 5 to about 6 weight percent of alumina oxide;  
from about 1 to about 9 weight percent alkaline earth oxide;  
from about 2 to about 5 weight percent zinc oxide;  
from about 0.1 to about 1.0 weight percent fluorine;  
a balance of the composition being silica; and  
wherein the glass fiber composition forms glass fibers having an  
average diameter of from about 0.1  $\mu\text{m}$  to about 8.15  $\mu\text{m}$ .

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14. The glass fiber composition of claim 13, wherein the glass fibers have an average diameter of from about 0.1  $\mu\text{m}$  to about 3.0  $\mu\text{m}$ .



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18. The method of claim 17, wherein the glass composition has boron present as  $B_2O_3$ , alkali oxide present as  $Na_2O$  and  $K_2O$ , and alkaline earth oxide present as  $CaO$  and  $MgO$ .

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19. The method of claim 17, wherein the glass fibers are spun to have an average diameter of from about  $0.1 \mu m$  to about  $3.0 \mu m$ .

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